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INDUSTRIAL EDUCATION

JAMES E. RUSSELL
FREDERICK G. BONSER

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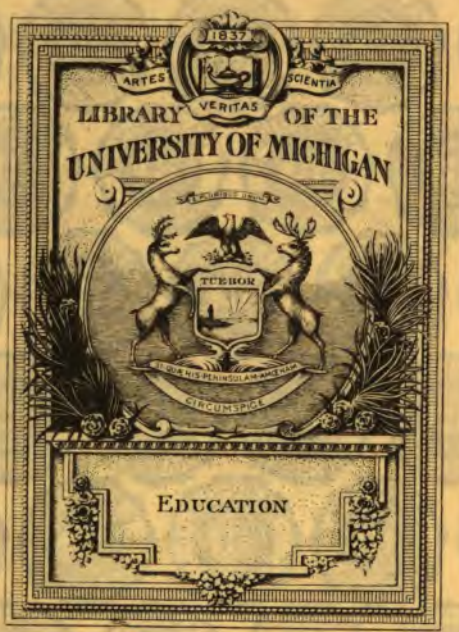
1914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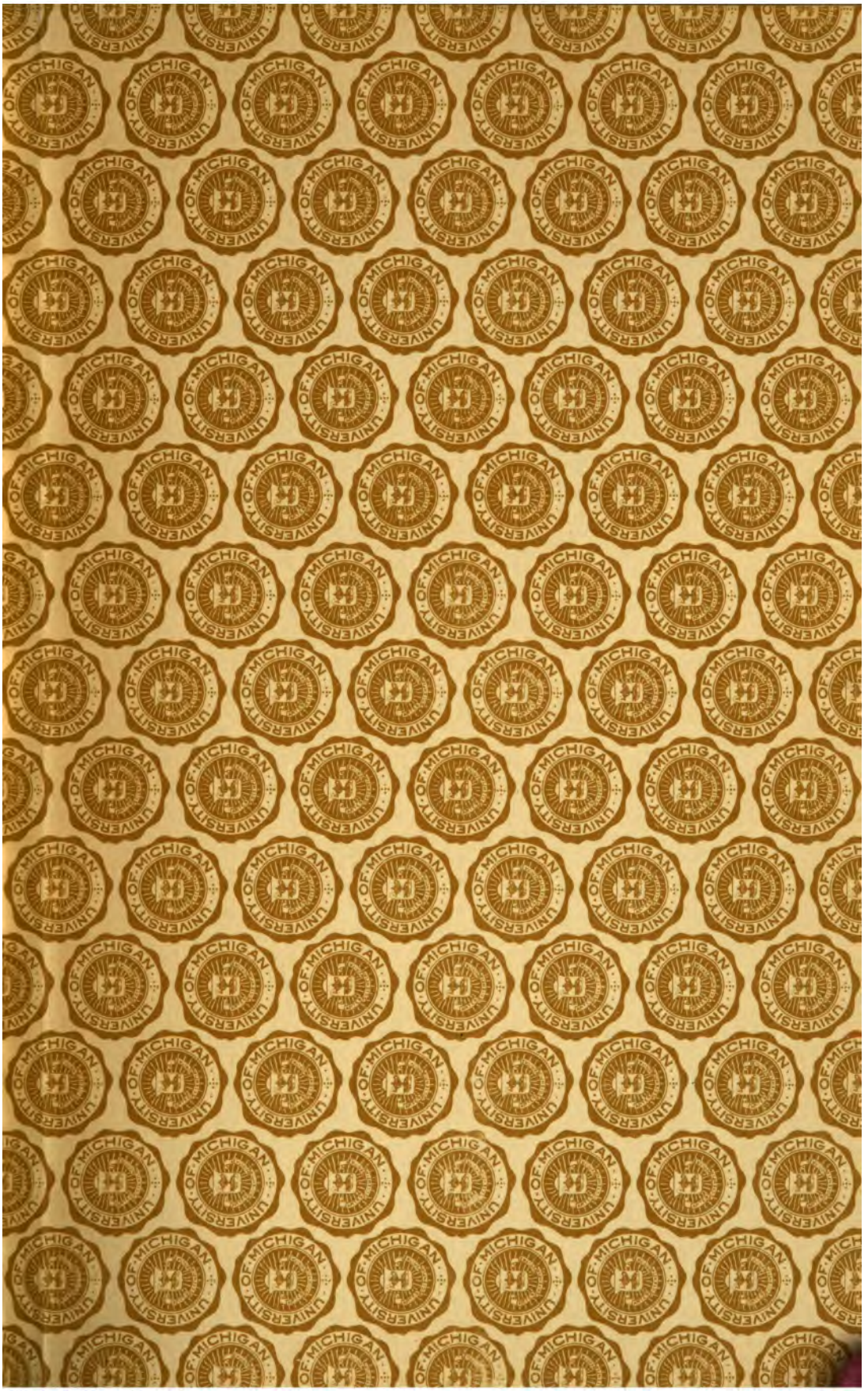
UNIVERSITY OF MICHIGAN

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INDUSTRIAL EDUCATION

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THE
SCHOOL AND INDUSTRIAL LIFE

JAMES E. RUSSELL

THE SCHOOL AND INDUSTRIAL LIFE*

The American school is under fire—it is always under fire. Just now it is said that its curriculum is overloaded with fads and frills which burden the child and hamper his training in subjects essential to his success in life. Public opinion is critical of a system which makes easy the advancement of a few to positions of commanding influence, but which provides no vocational training for the many who can not afford to remain in school beyond the elementary grades. The demand is for equality of opportunity in education without regard to social rank or wealth or any special privilege, that kind of equality which enables one to become a good American citizen, and which, as I understand it, is established on the ability to earn a decent livelihood and the determination to make one's life worth the living.

The instruction given in our public schools is chiefly of two kinds: (1) humanistic, including language and literature, history and civics, and the fine arts; and (2) scientific, including mathematics, geography, physics, chemistry, and biology. Our schools also provide for training in the practical arts which are required in the study of these subjects, preeminently the arts of reading, writing, singing, and drawing. Of late years the attention given to hygiene has begotten systematic training in gymnastics and athletic games. Our school work, however, is bookish, a term of reproach with some, but properly understood it stands above criticism. That which is worth knowing about human progress is for the most part contained in books. The scientific studies, as well as the

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humanistic, have been recorded in books; indeed, it would hardly be creditable to our civilization if the achievements of one generation were not made available for the generations that follow after. And what form more enduring, what form more available, than in writing which may be read by all who are willing to master the conventional arts confirmed by use and tradition! If our schools are culpably bookish, it is because our teachers misuse the book and confound methods of teaching with the acquisition of knowledge. Given something to learn, whether contained in a book or not, it is the teacher's business to see that the learner approaches his task in such a way as to make his progress certain and the results secure. If motor expression will help ease the way or better define the end, the good teacher will surely use it. And one should know that reading, writing, and singing are as truly means of motor expression as drawing or dancing or handiwork. In so far, therefore, as the aim of learning is to acquire knowledge, there is no good reason for spending an hour in manipulation when the fact may be as well taught without it in a minute. On the other hand, the fact which calls for motor expression and the process which demands technical skill, may never be acquired in their completeness without persistent drill. But drill for the sake of technical skill is one thing; motor expression for the sake of clarifying, strengthening, and assimilating knowledge is another thing. To learn by doing is well enough, if there is no better way; to do, without learning from it, is to drop to the level of the brute, a travesty on pedagogical insight.

The significance of motor expression in the learning process came to consciousness in our schools only a generation ago; indeed, we are only now becoming alive to its place and possibilities. Some got the notion at first that there was a magical charm in the training of hand and eye. Manual training was heralded as the remedy for all defects of vision, mental and physical, and the claim was made that in whittling paper-knives out of wood the boy was really shaping his own character. To follow exactly the specifications of a blue-

print drawing was thought to be the surest way of bringing home the lessons of honesty, sobriety, and truthfulness. Until within ten years, manual training was defended by its over-zealous advocates on the grounds of its value as a mental and moral discipline. It is difficult for us to see, even after the lapse of so few years, why so great worth was imputed to manual dexterity and so little value attached to good reading or legible writing or correct translation. It is past our comprehension even now how any one could have supposed that mere doing could rank in educational value with the doing of something worth while. The fact is, of course, that no one really thought, regardless of what may have been said, that making nothing and making something were one and the same. The early projects in manual training may seem to us trivial, but their value is not to be reckoned in terms of accomplishment, but rather in terms of effort. They represent an effort to secure at any cost the motor expression demanded by child nature. If the teacher of the humanities and the sciences would not employ it intelligently, here was a group of enthusiasts who would use it anyway, unintelligently if necessary. Public opinion, not always a safe pedagogical guide, supported them, and the result is a place in the curriculum for a subject which few know how to teach and which perhaps no one should teach in the way at first proposed.

In supporting the demand for manual training in the industrial and household arts, public opinion outran the educational theorists. Fathers and mothers care relatively little for formal discipline of any kind. They want tangible results. They want their children to be able to read, write, and reckon. Some go so far as to ask for an appreciation of good literature and the fine arts, and a working knowledge of history, civics, and the sciences, but such are always in the minority. The one thing that every parent wants, the one thing that gives him most anxious thought, is how best to make his child self-supporting. In manual training he sees a chance to develop that skill of hand required by the craftsman; in the

technical processes he discovers a likeness to the processes with which he is acquainted in the home or in the industrial world. The study promises material reward and he seizes the chance to turn it to account in the vocational training of his child.

Manual training in some form is here to stay. The teacher needs it in teaching not one subject, but most subjects; the public demands it because it offers the most obvious means of beginning the training for vocational life. Under the combined influence of pedagogical needs and public demands, the content of our manual training courses has been radically changed within the past decade. In the effort to give free expression to the child, all manner of projects have been carried out through hand work. Woolly sheep have sported with polar bears under fir trees set in a desert of sand. Bookbinding and block houses, Indian war bonnets and waterwheels, ink wells and Navajo blankets, bent iron jimcracks and raffia baskets, book shelves and dolls' clothes, broom holders and picture frames—all these and a thousand more mixed up in indescribable confusion! Is it any wonder that some one should raise the cry of fads and frills? The wonder is that any one should try to justify such work in school on any ground other than mere recreation. Absurd as it may seem when one reads over a list of manual projects actually put before our children in school, there has been consistent progress along two lines: (1) in the usableness of the completed article, and (2) in the design and artistic finish given to it. The difficulty of children's making really usable things contrasted with the ease of executing artistic design has largely changed the character of manual training within the past ten years. In fact, manual training to-day is little more than applied design. In this respect it is quite worth while. It is the best thing that has come into our schools in recent years, and we can not afford to lose it.

Manual training as applied design is a subject quite different from the sloyd and formal projects of twenty years ago. If manual discipline is no longer wanted for itself, one

may ask why the term manual training should be retained. Why not combine with drawing and call it all "art" or "applied design"? Another question—Why should we have distinct courses in the household arts in the lower grades of the elementary schools? The work done in these lines is either applied design or training in the technic of housewifery. This consideration raises another question: What is the place of vocational training in the elementary school?

One characteristic of the American school system is apparently fixed. The work of the first six years of the elementary school is fundamental, the same for all regardless of sex or future occupation. Six years of schooling is the usual legal requirement, and there is a consensus of opinion that specialization should not begin before the twelfth or thirteenth year of age. Some would defer it two years or more, but the number of children leaving school at or before the end of the sixth grade warrants the attempt to make the work of the first six years of the elementary course complete in itself, and as comprehensive as possible. Such a course should be cultural in the best sense, a course calculated to put the child in possession of his inheritance as a human being and fit him to enter upon whatever work may be expected of him in the years immediately following. With six years of good fundamental training, the child is ready at thirteen or fourteen to look forward to his life work. The physiological age suggests differentiation for the sexes. For those who go to college, it is time to begin specialization along academic lines; for those who are to become artizans or farmers or tradesmen, as soon as possible, it is time to begin vocational training. Specialization at the age of twelve to fourteen years should begin gradually, and in the vocational lines it should be essentially preparatory to the later years of trade school or apprentice training. My point is that when the boy or girl hears the call of vocational life, specialization should begin and gradually narrow into technical training for specific occupations—for some at the age of twenty-five in professions; for others at the age of sixteen in the trades. Between these

extremes will be found most vocations in which men and women engage. A fundamental course of six years, at once cultural and preparatory to the widest possible range of differentiated courses beginning with the seventh grade, is the chief desideratum of our American school system.

The present curriculum of our public schools, as I have already shown, is chiefly composed of humanistic and scientific subjects. We have made an attempt to introduce certain industrial and household arts, but they are so lacking in coherency as to raise serious doubts of their value as fundamental subjects. Nevertheless, there is another subject of instruction as fundamental as any now contained in the curriculum. If the humanistic studies are essential in the training of the child in his social relations, and the scientific in his relations to the physical world in which he lives, it is equally important that economic studies be included in the curriculum to provide instruction in the industries from which man gains his material possessions. Of course, I do not mean economic studies in the elementary school for the sake of technical training in any industry any more than I advocate the study of poetry in the grades for the training of the poet, or design for the artist, or biology for the physician. I mean the study of industries for the sake of a better perspective on man's achievements in controlling the production, distribution, and consumption of the things which constitute his material wealth. For these he labors his life long; on the use he makes of them depend much of his own happiness and the well-being of his fellows. It is only by means of such studies, whether pursued systematically in schools or picked up under the adverse conditions of after life, that we acquire the basis of judgment concerning the acts and aspirations of our fellow-men, either those who provide the capital for exploiting natural resources or those who do the work required in the several industrial pursuits. In our political life, no knowledge is of more consequence than that which is concerned with the relations of capital and labor; for us as a people there is nothing more to be desired than a sympa-

thetic understanding of the conditions under which men earn their living. Is a liberal education possible in this age without a knowledge of these things which more than all others make men free or leave them slaves?

A threefold division of the curriculum—humanistic, scientific, industrial—has the advantage over the present twofold division not only in providing a more liberal education, but also in affording a better preparation for the differentiated courses which begin in the grammar school. The training now given in language and literature, and in the arts and sciences of the elementary school, is of prime importance as a preparation for any course that a child may pursue later on; in some respects, no other training can approach it in practical worth even for the work of the lowest grade of trade school. Nevertheless, it is an assured fact that our boys and girls do not enter industrial life with the same confidence that they exhibit in other fields for which their academic training has fitted them. They see no fascination in industrial activity and they have no basis of judgment for choosing any particular career. The fault is largely due to avoidance of industrial instruction in the schools, as something degrading if not positively unclean, and the setting up in its place of unattainable ideals at variance with the actual conditions of society. I would not check the ambition of any American child, however high the goal—it is his birthright as an American citizen—but I would have the school help him define the aim of his life in terms of his own natural endowment and possible attainment. The child has a right to this kind of guidance; the school must give it, and what the school gives must be determined by sympathetic instruction along the lines leading to the goal.

The public, in giving support to manual training and the household arts, undoubtedly intends these subjects to promote closer relationship between the school and vocational life; some teachers of these subjects unquestionably do use them with precisely this intent; but efficient instruction presupposes something definite to teach and a consistent way of teaching

it. Subtract from our present manual training course that which is essentially applied design and those exercises which are intended to afford motor expression in the learning of other subjects in the curriculum, and what is left is an incoherent, unorganized series of projects without purposes or educational value. However good the artistic treatment, and however desirable the assistance given in acquiring knowledge of other subjects, the results now obtained contrast most unfavorably with what might be secured from a series of projects harmoniously organized to attain a specific end and at the same time incidentally to provide for the necessary motor expression and all needful application of artistic design. In other words, motor expression and art training may as well be secured as by-products in doing something worth while as by making them ends in themselves. Whatever value may attach to the subject-matter in such procedure is clear gain. The plan I propose, therefore, is intended to retain all that is of real worth in manual training and at the same time to get something still more to be desired. It is precisely the plan long followed by good teachers of reading and writing. The child in his reading may as well read the best of literature as the poorest, and in writing learn how to express himself clearly, concisely, and in good form as to follow everlastingly a copy-plate.

It may be interjected at this point that some teachers of manual training have used the subject as a means of introducing the child to the complexities of social life, that it has been a means of socializing him, that it has given him a chance to find himself in the midst of a highly artificial and conventional environment. If this be true, and the aim is certainly not an unworthy one, the end may as well be attained by putting the activities proposed on the high plane of real life.

The problem, then, is to organize the information within the industrial field in such a way as to make it valuable, first, in the education of the masses and, second, in technical training for specific vocations. There is no lack of information; what is knowable in any industry is beyond the reach

of any one save the most expert specialist, and even he is tantalized by his inability to grasp all within his reach. That a field is large, overwhelmingly large, ought not to deter the educator from entering it. The scientific field, for example, is large, overwhelmingly large, but when it is systematically classified the teacher is in a position to select that which may have educational value even for the youngest child. Without classification it might be possible to teach much of practical value, but the school course from infancy to adult life would present a sorry spectacle. The logical arrangement of scientific information is the only criterion of the worth of the completed scientific course. The selection of materials for presentation at any particular stage depends upon pedagogical insight which takes into account both the goal to be reached and the peculiarities of the learner. The way in which children learn determines the method of approach to any subject, but it sets no standard of worth upon the acquisition. The only criterion of excellence is to be found within the subject itself in its relations to human needs. How the child learns that 2x2=4 is a problem in psychology; whether 2x2 is actually 4, what relations it bears to other mathematical facts, and whether it is worth learning at all, are problems reaching far beyond child-psychology. In classifying the information within a given field, we establish standards by which we judge the relative worth of component parts and discriminate between what is essential or characteristic, and what is accidental or accessory. Such categories we have in the humanities and the sciences, and they control the trend of instruction throughout the school course. We need such a guide to the industries in order that every step from the kindergarten on to the technical school may fit into our plan for industrial education.

Much confusion in the work of manual training has come from a failure to distinguish between the psychological guide to methods of teaching and organizing subject-matter, and the logical guide to the sequence of topics and the value of the component parts. The need of food, clothing, and shelter,

for example, is easily brought home to a child. The psychical reaction to the suggestion that he satisfy these needs for himself is an excellent starting-point for the study of primitive life; it gives a splendid clue to ways of approaching certain fundamental industrial processes, and for that purpose may often be used advantageously in teaching. But to set up this principle as a guide for making courses of study is to confound means and ends. Everything worth having in this life has a place in the gratification of human wants—language and literature, science and fine arts, politics, law, and religion, no less than food, clothing, and shelter. What is suitable food, how it is produced, distributed, and prepared for eating, and what becomes of it in nutrition is a subject for study quite apart from the satisfaction of hunger. The need of sustaining life may make the study of great importance, but it suggests no classification of the knowledge abounding in the scientific and industrial processes. Likewise the need of speech for the interchange of ideas gives no clue to the systematic structure of language, to say nothing of the vocabulary and the grammatical characteristics of any particular language. The conclusion, therefore, is that the method of rediscovery of ways and means of satisfying human needs is no sufficient guide either to what children should learn or to the sequence of materials employed in instruction.

The industrial processes by which man acquires his material possessions and shapes them according to his desires, are directed to the transformation of natural resources. Raw materials are produced and worked over; they are distributed and put to use. Each step, if properly taken, adds to their value. What constitutes value and what means are employed to effect the change should be made the subject of instruction. True, the amount of human labor involved is immeasurable, the variety of human occupation almost inconceivable, and the range of productive activity wellnigh beyond our understanding, but the fundamental processes are limited and relatively simple in their operation.

For pedagogical purposes, the materials of most signifi-

cance in the industries are (1) foods, (2) textiles, (3) woods, (4) metals, and (5) clays and other allied earth materials. Fuels, supplying great industries in themselves, occupy a middle ground between industrial materials and the motive power employed in the industrial arts. Commerce is that industry which uses the products of all other industries in making things available for human consumption. This classification has the advantage of fixing attention on the stuffs out of which things are made and upon which human ingenuity brings to bear its most lavish expenditure of industrial effort. The next step is to single out the dominant processes in the successive stages of production, manufacture, and distribution, and their interrelations, peculiar to each class of materials. The facts concerning these processes constitute the subject-matter of instruction in the industries. The technical skill required in the operation of any industrial process is the object of vocational training.

A well organized course of study in the industries must be the joint work of technical and pedagogical experts. The scientist will be called upon to contribute his share, and his contribution will be no inconsiderable amount. At one stage of the course emphasis may be placed upon the processes of production; at another stage the stress may be upon manufacture, distribution, or consumption. Nature study, agriculture, the fisheries, forestry, and mining will furnish indispensable information. Geography, biology, physics, and chemistry will each add their quota of knowledge. Facilities for transportation, the production and transmission of power, and the agencies of trade and commerce will have a bearing on the problem. But the chief consideration in the course of study is the ordering of the industrial processes by which raw materials are transformed into things of greater value for the satisfaction of human needs.

The simplest industrial processes are often the most primitive. This fact suggests the desirability of sometimes approaching the study in the primary classes from the historical standpoint. To make the study of primitive life, however,

the dominant purpose of instruction leads to the introduction of much superfluous material which tends to crowd the curriculum and overburden the child. Wherever the approach can be made advantageously by way of primitive life or by plays and games which express children's emotions, that method may be employed. The impetus gained in this way should be directed to the apprehension of the systematic knowledge contained in the field under consideration. When textile processes, for example, are to be studied, the need of clothing may be emphasized and means suggested for gratifying the want. Projects for carding, spinning, and weaving may be carried out in simple ways and illustrated by reference to actual operations in bygone times or by the practises of contemporaneous primitive people. But to rediscover every step in the original development of these arts is to miss the purpose of industrial education; it may be good industrial history, but it is not good industrial training. The industrial aspects of the study, as distinguished from the historical, require that the child should acquire in some way and at some time—presumably in many ways and at widely separated times —a fairly well-rounded conception of textile processes and become familiar with the most important types of textile products. It is not enough to acquire a knowledge of the primitive process of spinning, even spinning on a wheel, and then to pass on to the weaving of a simple rug. Spinning is an important industry in modern life; it means yarns for all manner of fabrics made from a great variety of raw materials; it means thread of all kinds; it means cordage. How many of our school children, how many adults, have any adequate conception of the extent of these industries or their bearing on everyday life? And yet the processes are simple, and, by actual demonstration, supplemented by illustrations cut from current magazines or by visits to neighboring factories, the lesson can be taught in such a way as to make the learning a delight and the knowledge a permanent possession. On leaving the elementary school, every child should know, it seems to me, the characteristics of cotton, wool, silk, and linen,

both in the spun and woven forms, and have some notion of their value as determined by the processes to which they have been subjected. A proper combination of handwork, the application of design and the giving of information should produce the desired results without strain and with constantly increasing interest in the study. At the end of a high school course, possibly at the end of the grammar school, a girl should be able not only to make many articles of clothing, but also to discriminate in the choice of fabrics by reference to what she has learned in school concerning the nature of the several materials and the processes of manufacture. If she doesn't get this knowledge in school, when and where will she ever get it? And isn't it something which she has a right to know? How much time will it take, I ask, to give her a vastly better equipment in this field than ninety per cent of adults have to-day? It is less a problem of instruction or school administration, than it is a point of view and selection of materials for instruction. Once accept my proposition that this is worth doing, and the time can easily be found, and some day we shall have teachers prepared to do the work.

Again, let me illustrate from another field—from the clay industries. Children like to make mud pies. The kindergarten turns this aptitude to good use in fashioning things by hand molding. Of late, primary teachers have adopted clay as a convenient medium for expressing art forms. The result is thirty plaques, thirty ink wells, or thirty vases—all very pretty, decorated and glazed, when put in a row on exhibition day. So far I have no criticism. My complaint is that they stop right there. The chief processes in the clay industries are very few; hand molding, turning on the potter's wheel, pressing into set forms, and building up in permanent shape, as in cement and concrete construction. Why not, then, pass from hand molding, which can be approached through primitive types, to the use of the potter's wheel? A single demonstration of this machine, with the use of illustrations which may be had in abundance, will give the clue to the entire round of the pottery industries. A few samples, vary-

ing from unglazed earthenware to fine china, will complete the teaching equipment. Next come brick and terra-cotta. But who has ever heard of brick-making in school? I should like to hear of it because it is an immense industry, the products of which are visible on every hand—soft brick, hard brick, fire brick, red brick, yellow brick, ornamental brick, terra cotta. Why should not our children know more about these things than we do? I venture to say that ten hours of instruction judiciously spread over two or three years, and properly correlated with nature study and geography, will give to sixth grade children a better appreciation of one of the staple building materials than ninety out of every hundred adults have to-day. Is it worth the time? If so, the time can be found.

I might illustrate my point by any of the staple foods, by glass, by woods, or by metals. The working up of these materials, the getting them ready for use, does not involve many processes. The combination of processes is most intricate and the variety of products simply indescribable, but with an eye single to typical ways by which raw materials are transformed it is not impossible to leave with twelve-year-old children a lasting impression of the modes of operation in any industry and the nature of the most important results.

I am well aware that this plan will be criticized by some as being retrogressive, a return to a logical control of childish activities, and by others as abandonment of the new education through motor training. It may mean revolution, but if it results in a richer and more unified curriculum one critic is answered, and if the curriculum is thereby simplified the other critic will get no hearing from the American public. But how is the curriculum strengthened? First, it must be conceded that the content of industrial education, as I have defined it, has some value; whatever that may amount to is a distinct gain. In the second place, the plan calls for richer courses in arithmetic, nature study, and geography. The quantitative measurements of arithmetic will find concrete application in every step of the industrial process from the

first step of production of the raw materials to the end of the series when goods are turned to practical use. How much, how many times, how often, in what proportion, at what cost, are questions which must be answered by the child at every turn. The computations called for in the manufacture, transportation, and final distribution of any commodity are in daily use in trade and commerce, and should be the staple requirement of the school. Nothing will vitalize the study of arithmetic more than to create in the school a *need* for quantitative measurement and for the employment of business methods in business affairs. Such a situation suggests clearly the place and scope of commercial training in the upper grades or high school for those who are in training for commercial vocations. The natural distribution of metals, fuels, clays, and other earth materials, the climatic and physiographic conditions which determine the location, amount, character, and availability of our flora and fauna, the factors which control transportation by land and water—these are problems in geography which become concrete and vital in the study of industries. The correlations are so obvious that only a stupid teacher can miss them. In nature study we shall find a real place for the elements of agriculture and forestry; no longer aimless meandering in any scientific field, but definite attention to those occupations concerned with the production of materials good for food, clothing, and shelter, the conditions calculated to give best results, and the resistance which men meet in doing their work. The growing of any crop, even in a window garden, will epitomize the farmer's labors in tilling the soil, supplying plant food, utilizing light, heat, and air, overcoming disease and insect pests, and reaping his harvest. Every step takes on new meaning when the learner sees its place in the series of operations culminating in the commercial food supply of his own community, its sanitary regulation and domestic consumption. The elements of physiology and hygiene, and of physics and chemistry, are also called into requisition; they are all indispensable in fixing values of industrial products and determining economy in technical opera-

tion. What makes for hygienic living is as well worth knowing from the economic standpoint as what mechanical appliance will most increase the output. A proper study of the industries, therefore, I contend, will bring about a unified and closely correlated course in the biological and physical sciences by way of supplying the information wanted by the child in adjusting himself to the real world.

Perhaps some timorous soul will interpret my outline of the pedagogical relations between the sciences and the industries as a denial of any independence to arithmetic, nature study, and geography. Far from it. The scientific subjects have a function of their own in the curriculum, as do the humanities and the industries. The use of language and the arts of reading and writing in studying the industries, even the generous use of supplementary readings giving industrial information, does not preclude the study of literature in progressively systematic form. The course of study in every subject may have two aspects, one peculiar to itself by virtue of which we recognize it as a distinct subject, the other relative to other subjects which the child may be learning. In arithmetic, that which is peculiarly mathematical looks forward to the systematic development of the science of mathematics, and it is possible so to emphasize this aspect as to make the study almost exclusively formal. The natural sciences may be so taught as to have no direct bearing on the child's experience. My thought is that any subject worthy of a place in the school curriculum should be developed along systematic lines characteristic of the subject itself by means which function in the child's experience with other subjects of information. This is only another way of saying that whatever is learned should be applied in practise. Perhaps better said, it is the harmonious interaction of all subjects in the curriculum which gives zest to study, solidarity in the knowledge acquired, and efficiency in converting knowledge into power. The reason for this is that the learning process is a unity; the child's experience in gathering information from many sources is unified, and it is his own: his instincts,

impulses, and all his activities belong to him alone, and however segregated the ultimate ends of his endeavor may be in the mind of his teacher, he weaves all his experiences into the fabric of his own life. Whether or not that fabric be technically correct depends upon the systematic ordering of his experiences; its serviceableness for any particular purpose depends upon the materials which have entered into it.

One other important question awaits an answer. Will the plan I have proposed tend to simplify the curriculum? My answer is that at least four subjects will be combined into one, and in some elementary schools one teacher will take the place of four. Manual training, fine arts, domestic art, and domestic science will drop out below the seventh grade, and in their place we shall have the one subject of industrial arts, the elements of industries. The term "manual training," if used at all, will cover the forms of motor expression employed in teaching reading, writing, and drawing, as well as the manual exercises used in agriculture or weaving or pottery making or carpentry. There will be no hours set apart in the school program for work *exclusively* with the hands, and teachers will not be expected to provide manual occupations for every minute of the time assigned to any subject. When manual work is needed it will be demanded as insistently and employed as successfully in the humanities and the sciences as in the industries. In the lower school, manual exercises will be used as a means of self-expression, a method of teaching rather than a subject of instruction or a way of acquiring technical skill. That is, cooking in the lower school is to enable the child to know what happens when heat is applied to foods, and in what respects foods thereby are made more serviceable; cooking as an art in which a girl should excel belongs to a later period when she is fitting herself for housekeeping. Technical skill is a distinct aim in vocational training, but in the earlier years of school the purpose is general rather than specific, cultural rather than vocational.

In all industrial processes, wherever man transforms materials into things of greater value, he employs a technic

peculiar to the situation, and gives to the product a touch which pleases his aesthetic sense. Earthen bowls might be made, I suppose, without appreciable artistic merit, but the fact is, that the crudest pottery shows an effort to attain some ideal standard. This striving for artistic effect is as instinctive in childhood as in primitive man, and no worker ever loses it until he loses all pride in his handiwork. It is the source of every fine art. It is self-expression, which is at its best when bodied forth in doing things worth doing well. The teacher of art, therefore, finds his best opportunity in that field which offers greatest inducement to constructive design. The art training which belongs in the elementary schhol is that training which makes for a better appreciation of aesthetic standards and which finds expression in making things more pleasing than they otherwise would be. It adds no burden to the curriculum; on the contrary, it enlivens it and makes its tasks more pleasurable because more gratifying to personal wants.

A systematic course in the industries will have the additional advantage of making it easier to teach everything else in the curriculum. Not only will the study of industrial processes give rise to concrete problems in mathematics and the natural sciences, but the practical character of such problems will incite children to find the surest and most business-like way of solving them. Time will be saved for drill in every other line. With fewer subjects and more practical problems, I should confidently expect better results in the three Rs and a more thorough discipline resulting from work in every subject. There would be no attempt to cover the whole field of human effort; the standard set in the study of industries whereby only the essential processes should be included in the course of study would react upon the courses of study in the humanities and the sciences. Let it be agreed that only fundamentals have a place in the elementary curriculum, and it will be comparatively easy to insist upon thorough work. Under such conditions there can be no excuse for not getting it. Those who believe, as I do, in the educational value of

work well done, will join hands right here with those who advocate a curriculum which imposes tasks worth doing well.

My conclusion is that industrial education is essential to the social and political well-being of a democracy. It is the privilege of all, rather than the duty of a few, to be informed on matters affecting the social welfare of the body politic. A knowledge of how men get a living, the nature of their work, and the value of it, is a prerequisite to intelligent appreciation of the dignity of labor. A sympathetic understanding of the conditions underlying industrial competition will make for civil order and social stability. Training for citizenship may not safely disregard the dominant interests of the great majority of citizens. The public school must teach that which all should know. If only six years can be had for this work, the work must be done in six years. There is no alternative. It must be done in such a way, too, that children will grasp its significance and carry its impressions throughout their lives. It must establish such habits of thought and conduct that all subsequent work will be aided by the discipline This is the ideal of the elementary school Joined with the humanities and the sciences, a study of the industries rounds out the education of the citizen and equips him to begin his vocational training On the threshold of active life it puts him on a par with his fellows It assures him that kind of equality which is the opportunity of every American.

FUNDAMENTAL VALUES IN INDUSTRIAL EDUCATION

FREDERICK G. BONSER

FUNDAMENTAL VALUES IN INDUSTRIAL EDUCATION *

When the American people become fully conscious of an idea for reform, the idea expresses itself in practical application with astonishing and often wasteful rapidity. There is occasionally a suggestion that the present-day conduct of industrial education may be an illustration of this tendency.

Recent conditions have brought about a consciousness of need for more intelligence and training among the workers in industrial vocations that is almost phenomenal in its breadth and intensity. This need has expressed itself in a demand for a kind of school work which would produce immediate returns in terms of increased skill and technical efficiency in industrial vocations. Numerous and varied interests have combined to bring about a response to this demand in the form of many industrial schools whose chief end is frankly vocational. Much, too, has been said and written about these schools in the immediate past, but very little, relatively, has been said, written, or accomplished toward realizing a solution for this industrial education problem through the general or regular school system Naturally conservative, the public school has responded but slowly to this new demand which has come with such a rush Public elementary and secondary schools have been developed largely on the theory that they were supplementary to vocations. Their end point has been cultural or liberal A segregation of industrial education and training has thus come about in many instances whereby an almost complete separation of liberal education

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and industrial education has resulted. Whether this segregation is not dangerous, and also unnecessary and therefore wasteful, we shall try to indicate after more fully considering the problem in its more fundamental aspects.

Although slow in responding by adequate courses of study and programs of work, the general school system has not been insensible to the demands made upon it. Two entirely different elements have contributed to focus attention and effort upon the problem of readjustment looking to the appropriate recognition of the industrial arts. The one already suggested is the recent demand for a higher degree of skill and efficiency in the industrial worker. The other embraces a number of historic influences which have been developing with increasing clearness in the field of pedagogy since the Renaissance. In the realism of Bacon, Comenius and Pestalozzi; the naturalism of Rousseau; the doctrines of apperception and many-sided interest of Herbart; the principles of development by participation of Froebel; and the general pragmatism evolved in recent years through the scientific and sociological movements in education—in all of these we see a progressively broadening tendency to bring the work of the school into a more vital relationship with the immediate world of activities and interests in which the child lives. Nature study, agriculture, drawing, hand work, manual training, domestic art, domestic science, housewifery, household arts, and manual arts are all terms for kinds of work which have helped to overcome the isolation between the school and life. But viewed from the standpoints of both the vocations and pedagogy, results have been somewhat disappointing. Degrees of skill and efficiency commensurate with vocational standards have not been attained; and thought content has not been sufficiently rich to assure that educational value demanded of a school study. The movement to organize, enrich and more scrupulously to evaluate on the basis of educational worths the field of subject matter in the industrial arts is the movement characterizing the attitude of the school as an institution to-day.

To meet these common needs—those of the vocations and

those of the child—in the most satisfactory way possible means practically a complete revision in our evaluation and selection of subject matter for the whole school curriculum. It means working over the materials and methods of education and training on the basis of the most vital life needs of the present time. Such perspective must be maintained that the part will not be exalted above the whole. Justification for every topic considered will have to be in relationship to some appreciable value and on the basis of some fundamental principle.

Among the distinctions which it will be necessary to keep constantly in mind is that of *educational* value as distinguished from merely *training* value. Training primarily develops skill in a form of activity; educational value means value in controlling conduct. Anything which helps to shape one's attitude of mind, one's habits of thinking, one's standards of appreciating or one's bases of choice has educational value in a degree measured by its influence for good in one or more of these directions. Now merely learning a number of neuro-muscular co-ordinations such as those involved in sewing, cooking, woodwork, clay work, or any other form of " manual training " can not be shown to have contributed much to any one of these larger educational values. After getting clear notions of what is to be done, the lower centres of the brain, and the spinal cord are the only parts of the nervous system much employed in these activities. Here is the vital weakness in " manual training " as an educational subject so long as it retains its etymological significance in the character of its work. Mere motor training does not require much use of the frontal lobes of the brain. Repetitions of motor activities for the sake of greater skill soon reduce themselves to the same type and level of activity as practice in penmanship and have no more educational value. That motor activities have educational value is by no means to be ignored; but because of the danger of overestimating them and exploiting them at the expense of much greater values, it is the more necessary clearly to distinguish our measures of worth.

In the foregoing distinctions, it is believed that there lies

the basis for distinguishing between the appropriate work of the general school system, elementary and secondary, and the specialized school for specific technical training It is offered that *the general school system should provide as a part of its legitimate work those phases of the industrial arts which are primarily educational; and that whenever specialized training whose chief end point is a high degree of skill, and technical efficiency becomes the primary aim the work of the segregated trade or vocational school or course should begin. This attitude for both the elementary and the secondary schools in the general system would limit work in manipulation of materials and processes of construction actually participated in to those whose purpose is the development of clear ideas and appreciative insights.* On sufficient investigation and development, it may appear that if time is given to the hand work of all kinds adequate for the development of industrial intelligence, industrial insight and industrial appreciation, all of the demands made from the standpoint of the development of muscular control and co-ordination, constructive instincts, and manipulative skills will be accomplished, save as these activities need that refinement and speed which can be acquired only through the repeated practice of the trade or the trade school.

It is not the purpose of this discussion to enter at all into the problem of the specialized work of the trade school whose purpose is frankly the development of skills in specific vocational activities, but rather to confine itself to those studies in the industrial arts and their social relationships which are appropriate to the public, democratic elementary and secondary schools. In our zeal to give adequate place to the industrial arts, we shall try to avoid giving an emphasis to their technical content which would make them overshadow that broader education to which they contribute.

That we may keep our perspective in the problem, we shall rely upon a principle which we believe to be supported alike by psychology, sociology and ethics. Simply stated, this principle holds that *there are more qualities, needs, and forms of activity in which individuals are alike than in which they are*

different. Those fundamentals of greatest life worth are common to all. They are scarcely dependent upon or involved in vocations at all, excepting as vocations are means to ends. Theodore Roosevelt once said, "If a man is himself the right kind of man, he will speedily find among the anthracite miners as among the farmers in the East, or the planters in the South, or the ranchmen in the West, or mechanics or lawyers or bankers, that the vital differences and vital affinities have to do with the quality of the man and not with the accidents of his position or labor save as these tend to shape the above mentioned qualities." Those necessary modifications of work based upon individual differences in aptitudes and capacities which differentiate people into appropriate vocational groups only intensify the need for the efficient development of those qualities common to all, for it is in just these elements that differences are hostile and hateful to true democracy.

From the standpoint here proposed, industrial studies would be the same, in the elementary school, for all children, regardless of sex or future vocation—the same for prospective doctors or lawyers as for prospective mechanics or farmers. The end point is that common knowledge, experience, appreciation, and sympathy which are necessary to effective manhood and womanhood in any life activity By elementary education we mean just this period of growth in which the content of the curriculum is undifferentiated on the basis of either social or individual specialization, a period in which interests are common and general for all Growth is toward efficient functioning in any field of human activity. Values are all broadly humanistic.

As an elementary school subject, industrial arts must stand the same test, be measured by the same standards, as any other elementary school subject. Broadly, this test is, first, that it shall consist of a body of thought and experience sufficiently important to human well being to justify acquainting all children with its content In the second place, this subject matter must be susceptible of such gradation and treatment that it

will lend itself to the interests and capacities of school children and to the practical possibilities of school instruction. As a secondary school subject, industrial arts must meet just as fully the test of rich thought content and humanistic values as any other appropriate secondary school subject. Secondary education differs from elementary education chiefly in requiring certain forms of differentiation in response to differences developing in individual interests, capacities, and inclinations in *groups* of social activities. Interests are still broadly relational to general social life, yet are developing in the direction of special forms of activity. Values are still humanistic but in a more restricted field. Highly developed technical skill is not the chief end point of the handwork. Increased knowledge of scientific principles and processes in industrial fields, maturing judgment in interpreting industrial problems and relationships, and growing standards of industrial phases of social life are the elements without which a secondary study of the industrial arts is almost devoid of educational values.

Based upon this preliminary survey, I shall now offer three definite propositions and develop each in some detail:

First, that the industrial arts, rightly interpreted, contain a body of thought and experience sufficiently vital to human well being to give the subject a place in the elementary and secondary school curriculum on a basis of thorough respectability and validity.

Second, that properly organized, the industrial arts will involve a revitalizing and motivating of much of the other subject matter of the school curriculum, providing valid tests for selection and elimination on the basis of really human values.

Third, that the social and liberal elements in the study of the industrial arts are more significant than are the elements involved in the mere manipulation of materials.

That the industries are of vital importance is evident when we recall that matters of food, clothing, shelter, transportation, and numerous other industrial items are topics of almost

hourly consideration. In 1900, of all of the people in the United States engaged in gainful occupations, 76.3 per cent were employed in productive industry of some kind. It is just because this industrial experience is so vital to the race as a whole, both now and in the past, that it is valid as experience for every child that he may understand and appreciate its significance.

To live to-day with an intelligent understanding and appreciation of the industrial world requires profoundly more knowledge and experience than were required two generations ago. Conditions of to-day make the school the only institution through which this body of experience can be systematically acquired. Looking into the available field it is very easy to see the extent of its content. By the Census Bureau of the United States, there were in this country, in 1900, 354 separate industries of a purely manufacturing type with a host of supplementary industrial and commercial occupations concerned with the production, transformation, and distribution of raw materials and finished products. Measured by their relationship to general human well-being many of these are insignificant. But by a rather natural grouping on the basis of materials used, those of greatest importance may readily be resolved into five or six general classes. The five groups suggested by Dean James E. Russell of Teachers College in the preceding article, include those industries relating respectively to food products, textiles, wood products, iron and other metals, and clay and allied earth products. Our work so far with foods has been called domestic science; with textiles, domestic arts; and with wood, metals, and clay, manual training. The designing and decorating of projects of whatever kind have been included by drawing. But every one of these subjects has been largely formal and the work accomplished with little relationship to the industries represented. The side of execution has been developed to the almost total neglect of thought content or humanistic value.

Now it is offered that by taking proper units of work from each of these five fields, a subject of study can be developed

largely taking the place of the four subjects, drawing, manual training, domestic science, and domestic art which will include the really most vital and fundamental elements in all of these. It is offered that this subject will have a body of thought that will command respect, and that in developing a knowledge and intelligent understanding of social and economic relationships essential to every child, and an appreciation for and sympathy with the work of industrial vocations, it will be as valuable as any other subject in the elementary school. In developing such a course, definite units typical of important industries must be selected. These will have to be graded in such sequence that simple phases are developed in the lower grades, more complex phases as the pupil proceeds into higher grades. The units will have to be offered in such order that there will be provided the proper opportunities and motives for the development of power and some degree of efficiency in the manipulation of materials. The projects in wood, for example, will have to be so selected as to be within the range of possible construction for the respective grades, and will have to be in such sequence as to develop a growing knowledge of the use of tools, and a growing complexity in the principles and processes of construction. But this will be just as easily accomplished if the dominant motive is the thought side of the piece of work as a type study in some large industry as if the chief end point were skillful manipulation. The making of a cabinet in wood, of a garment in textiles, of a cold chisel in iron, of bread, or cheese, or sugar among foods, are all so rich in thought material that every one of them may be taught without any of that formal grind that so often robs all manual school work of any real developmental value. The great point of emphasis for all of these studies in the elementary school is not skill in manipulation—is not the art side primarily in any instance. The manipulation of materials—work with the hands in wood, iron, textiles, foods, or clays—is here for the purpose of helping the mind to grasp the meaning of these industrial activities,—to utilize expressive capacity along with acquisition. It is to clarify ideas and

appreciative meanings, feelings, difficulties, and excellencies, and not to make mechanics or cooks, or dressmakers, or special workers in any other field. Through the work of the school the child must get this fundamental knowledge and experience once furnished by his everyday life.

I shall now try to suggest a number of units of industrial work which will illustrate possibilities. Recalling the suggested grouping into five fields, namely, foods, textiles, woods, metals, and clays and allied earth products, we shall see that each furnishes an extensive quota of subjects. Divisions of foods which readily suggest themselves are cereals, fruits, vegetables, milk products, meats, eggs, and fish. Under cereals we have the commercial processes of milling, starch making, sugar and oil manufacture, canning, and cooking. Several of the most fundamental processes involved are possible of demonstration by the children in the schools. The grinding of corn and wheat may be accomplished in the various ways in which this has developed historically; a mill may be visited where the work is done in a small but modern way; the various products from milling—the kinds of flour and meal made—may be shown by samples and their relative constituents and values learned as well as the methods of their respective production; finally through books, the large descriptive phases of the milling industry may be taken up. The work would not all come in one grade. Simple cracking of grains by stones and grinding by the mortar and pestle may be taken up in a very early grade; visits to mills may come later, in the fourth or fifth grade; and the larger phases of the industry considered perhaps later in a more systematic study of industrial geography. Starch and sugar making may also be demonstrated as large industries. Canning still has a small place as a domestic industry and may serve as a point of departure for the larger industry. For fruits and vegetables, studies are possible in canning, evaporating, preserving, pickling, sugar making—from beets and grapes—and cooking. Under milk products are the industries of butter and cheese making, and of condensed milk manufacture. In the study

of meats, eggs, and fish, while little can be done comparable with the handling of these products by large packing houses, simple processes of drying, canning, preserving, pickling, and cooking can be taken up, and the simpler by-products, as soap making and fertilizers, can be studied first hand. In none of these, not even the cooking, is it to be assumed that children in the grades, would develop much skill on the art side—no more than it is to be assumed that their study of poetry, pictures, or music in the grades will make poets, artists or musicians of them. But through the participation in the typical processes of these industries in so far as this is possible, as points of departure for the study of the larger phases of the industries from pictures, museum materials, and books, the children will have become intelligent and appreciative in many elements wherein they are now ignorant and unsympathetic.

In textiles, the four great staples, wool, cotton, linen, and silk, may be studied in all of the fundamental processes of their manufacture. For wool, it is possible in lower grades to begin with a sheep pelt and have the children themselves accomplish the washing, combing, carding, spinning, dyeing. weaving, fulling, shearing, shrinking and pressing of the wool. Later studies may be given to the commercial methods of manufacture, to the differences between worsteds and other wools, to the content of felt, shoddy, cashmere, mohair, alpaca, and camel's hair. In the study of cotton, the ginning, cleaning, carding, and other processes may be reproduced by the children. Mercerization and other commercial processes may come in upper grades. The various combinations of cotton and wool, testing, dyeing, cleaning, washing, and numerous other topics, as well as descriptive studies of the great milling centres and processes, of wages, of the social conditions of labor, of the extent and meaning of these industries, of allied industries as custom clothing manufacture, sweat shops, and so on, may all be taken up in their proper relationships in upper grades. Flax may be grown in the school garden and rippled, retted, broken, scutched, heckled, spun, dyed, woven,

and bleached. The children of several schools have done most of this, making their own apparatus. Allied textile materials may be studied in this connection—jute, hemp, manila, sisal, China grass, and other important tropical fibres. Silk may be grown, spun, woven, and dyed if desired, as the eggs of the silk-worm may now be had for the asking. The textile field with its manifold phases and its profound importance offers a wealth of material. An art education of the highest order lies latent in its study. Studies in color harmony, design and decoration in textiles themselves, in dress, laces, rugs, carpets, curtains, and other furnishings of many kinds are of everyday importance and the raw material for such studies lies all about us. For woods, we may study milling, rough and finished, carpentering, cabinet making, box making, and cooperage first hand. Not to make carpenters or coopers or cabinet makers, but to learn the kinds and qualities of woods used and the reasons, the processes of handling and the reasons, the tools used and the reasons, the stains, varnishes, and paints used and the reasons, the appropriateness of selections of wood and design to the purposes, the relation of wood-working industries to other industries and to our whole social life—these are the aims. In metal work we can easily demonstrate simple processes of smelting, forging, molding and casting, steel making, and milling in iron; we can show plating, pressing, riveting, and soldering in tin; rolling and casting in zinc and lead; and plating, engraving, and hammering in copper, illustrative of the same processes in nickel, silver, and gold. A simple demonstration is here possible of many processes with little more than a test tube or crucible, a gas or alcohol lamp, and the raw materials. The smaller forms of these industries are further illustrated in blacksmith shops, foundries, tin-shops, and jeweler's shops. This field of metal work is bristling with opportunities for fine art education not yet begun to be appreciated. It is not that these studies are impossible that has kept them out of the schools but that we have not thought them worth while. For clay and allied earth products, we have possible studies in the processes of pottery

making, the making of brick and tile, stone cutting, lime and cement construction, and perhaps porcelain and glass. Besides these five larger fields, foods, textiles, woods, metals, and clay and allied earth products, there are a number of miscellaneous industries—basketry, paper making, printing, and illustrating, book-binding, upholstering, leather work, making of toys and games, making electrical apparatus, and a few others of large import which may be utilized.

That drawing is adequately provided for is clearly evident when we remember that, rightly taught, every project in wood, metals, textiles, or clay would have to be designed and that many projects in paper, wood, textiles, and clay would call for decoration. Appropriate design and decoration—the largest motives in all phases of drawing—would call into usage practically every form of line, light, and shade, and color —together with underlying principles and great variety of application, suitable to elementary school children. This work, together with the illustrative drawing in other subjects, and the development and drill work necessary for these would furnish adequate opportunity for the development of both such intelligence and power as are possible in the grades. The work in all phases of industrial construction would furnish material for cultivation of appreciation. Masterpieces would be necessary in all lines as a part of the plan of study—good and artistic pieces of wood work, of metal work, of textiles, of china and other pottery, would all be helpful and stimulating as well as would the products of fine art in pictures, statuary, and architecture in the study of decorative design. Studies of color harmony in clothing, in household equipment—carpets, curtains, and wall-papers, in furniture, and in china are productive of the most useful type of cultivated taste. All artisanship leads to art.

I have tried to show by this brief enumeration of a few typical industries the wealth of possibilities in a field vital to us all but of which most of us are profoundly ignorant. As I have grouped these four lines of work now called manual training, drawing, domestic science, and domestic art, it per-

haps occurs to one that nothing is included of agriculture or other forms of producing raw materials. While our broader term industrial includes these, it is found that for purposes of classification, all of that matter having to do with production, or with scientific processes, as such, for the elementary school, may well be placed with the work in nature study. Those descriptive phases of each industry taken which cannot be demonstrated or observed first hand, together with the transportation, trade, and allied activities in the distribution of commodities, make up the appropriate subject matter of industrial and commercial geography. Although the three phases will constantly overlap, points of emphasis may be illustrated by the use of one or two units. In the study of iron, for example, the oxidation of iron by the use of coke in a test tube or crucible as a demonstration of a scientific process may be clearly called nature study. Melting down pig iron or making steel for the purpose of casting, rolling, and milling and studying these processes as typical of great industrial operations together with visiting a foundry and metal shop to see the processes on a large scale, may be called industrial art. Studying the location of iron mines and the methods of mining, the transportation of ores, the location and description of the chief iron and steel plants, a consideration of the great variety and character of iron and steel products, and the distribution and trade of these products, are appropriate topics in industrial and commercial geography. In the raising of corn, questions of soils, methods of fertilizing, drainage, time and methods of planting, cultivation and harvest, insect pests, relation of birds to corn growing, and all other questions of this kind until the corn is placed upon the market belong with nature study or agriculture. But when the corn is taken to a starch factory, and the processes of starch making begin, the work is in the field of industrial art. The location of corn belts, of starch factories, and the transportation and trade of starch are matters of geography. However, we need think of no hard and fast lines of distinction. It is not what we call the work that is essential. That

we somehow get it provided for reasonably without crowding is the essential point.

Let it be not thought that the organization of this type of work will over-emphasize the utilitarian. We are prone to forget how really little of genuine culture the majority of pupils get from the elementary school as it is. Something must be done to make the school seem, and in fact be, more really worth while. In the report of the Commissioner of Education for 1908, we learn that in 1906-07 the proportion of children of school age, from five to eighteen years, who were actually attending school was 69.6 per cent. In 1900 the proportion was 72.4 per cent. This shows a loss of 2.8, or nearly 3 per cent. Parents are challenging the schools and are permitting, or even encouraging, their children to withdraw from school that they may do something useful. The remoteness of school work from life must be overcome. The use of the industries is basic as a material out of which and upon which to build that culture of hand and brain and soul which makes the individual alert, inventive, intelligent, appreciative, and moral in any vocational activity which either choice or circumstance may impose. Such treatment of the industries as is proposed would vitalize every subject of the school curriculum. The subject matter of arithmetic, geography, history, and English is largely the materials, the sources, the relationships, the evolution, and the social significance of man's activities in procuring food, clothing, and shelter, his first and most fundamental needs. Again I would say, have no fear of the term utilitarian as a basic principle for educational activity. Culture that is genuine is founded upon and vitally involved in utilitarian activities. It is but the expression of these most fundamental utilitarian and social relationships in their idealistic aspects that gives us much of our most cherished art, literature, and music.

By the introduction of these forms of study the *method* of our work is also markedly improved. Processes and principles are approached with a real motive. Situations are presented as problems to be solved. Their solution often involves

constructions in laboratories and shops, excursions, investigations, and questions of people and books. Throughout, the social relationships—the principles of interdependence, need of ethical co-operation, and the industrial and commercial unity of mankind—may be brought vividly to the consciousness of the pupils. In studying the evolution of vocations, institutions, and customs of the past—history in all its phases —constant comparisons may be made to how the bearings of these early developments upon conditions of the present. The skill in building, in the carving of stone, in the making of tapestries, in fine work in brass and other metals, in painting upon canvas or upon wall spaces, in the staining of glass, in the making of fine China and other potter's wares would all lead into appreciative studies sooner or later of such men as Phidias Michael Angelo, Raphael, Christopher Wren, Josiah Wedgwood, William Morris, and a host of other worthies quite as important as the names of the military heroes whose names alone stand for history in the minds of most young people. In present-day references, this work will establish an appreciation of our dependence upon the well being of our foreign neighbors for supplies and markets; a permanent attitude of fellow feeling for mankind wherever found; and an attitude making against prejudice and snobbishness.

It is surprising to follow out the implications of this study of the industries in their bearings upon the other subjects of study. The work is bristling with problems which constitute the real materials of arithmetic usable in common, practical life. Arithmetic should help to teach us the economic necessity of the intelligent use of raw materials, the avoidance of waste, and the conservation of resources, as well as its fundamental technical operations. It might easily be shown that the content of nearly every other school subject is vitally enriched. Nearly every unit of appropriate industrial subject matter reaches out into the field of geology, geography, history, social science, mathematics, economics, literature and art.

In the reorganization here proposed, there is no enlargement of the curriculum in the number of subjects, but rather a reduction. For the four former subjects, drawing, manual training, domestic science, and domestic art, we shall now have the one subject, industrial arts. This one subject, representing a content of thought and experience rich and vital in human values, may take its place in the elementary school as dignified and respectable as geography or history or arithmetic.

From all points of view—that of intrinsic interest in the content, that of the vital relation between the content and life, that of the more substantial bearing of the work upon any calling the child may afterward follow, that of vitalizing the other subjects of study, and that of making the school really democratic by furnishing equal opportunity for the development of all kinds of normal minds and aptitudes—from all of these points of view, this plan seems to commend itself as desirable for the elementary school.

For the secondary school the problem changes somewhat by virtue of the need for differentiation of courses for various types of students. When this differentiation rests upon the natural basis of the needs of growing children it will certainly begin more nearly at the close of the sixth grade than of the eighth. As has already been suggested, the solution proposed is for a common, democratic secondary school with courses of study adapted to the needs of those five groups of life callings, the professional, commercial, agricultural, industrial and household. That these courses may be equally democratic, each must be as rich in educational or life values as any of the others. Naturally some subjects would probably be taken in common by all students. But others would be elected because of their bearings upon the natural interests, aptitudes and inclinations of the student. The chief concern about any subject introduced should be its *richness in valid educational content.* If studies for the industrial and household arts groups are made up largely of scientific and geographical principles and problems in direct relationship to shop and laboratory work; of the historic settings and rela-

tionships of the industries as they have developed; of the larger economic and social values of the industries; of the thoughts and feelings enkindled by man's' reflection upon and emotional interpretation of the meanings and higher significance of his work as expressed in his literature, music and art—if the studies in metals, woods, and clays are all shot through and through with these vital human values, then will the work be truly educational and cultural.

There would be much concentrated attention upon the processes and practice in the dominant industries studied, of course. Shop work in wood, metals, and clay for boys, and in textiles and foods for girls should be as rigidly intensive and thorough for students electing industrial and household studies as are foreign languages for classical students. Appreciation of technical excellence can not be fully developed without active participation in production. Attempts to do skillful work are necessary fully to appreciate its meaning. That "inner felt series," so emphasized by Professor James, is an essential to the highest appreciation in an art activity. Probably two usual periods each school day in actually doing shop or laboratory work of some kind could be required and justified on an educational basis. So long as the student is dealing *primarily with ideas,* with activities full of meaning, and not merely with hand manipulations, the work has educational worth.

I have maintained that this is not specifically vocational training—no more so for the industrial or household or commercial groups of students than is their appropriate work for the professional group. Values emphasized throughout are human. The end point is primarily the intelligent and efficient development of the boy and the girl, not of the industrial commodities which they are to produce. But I believe it is equally valid to maintain that this form of education is of the very highest value as applied to vocational work. Every week the boy spends in such a school should make him just so much better qualified to enter an industrial vocation with power for more rapid adjustment to its needs, and growth

toward mastery of its technic. Statistics already beginning to accumulate point to the fact that a boy with a high school course including industrial subjects will have a much greater earning capacity in a trade the second year after graduation than will the boy who left school at the beginning of the secondary period and worked continuously at the trade during the whole four years spent by the first boy in school. From the vocational standpoint, viewed in its narrowest sense, such an education pays. Viewed from the broader standpoint of citizenship and efficient life in its fulness there is incomparably more in possibility for the boy with such an education than for the boy without it.

In making this appeal for a type of public school education for industrial workers, I am not condemning the numerous technical, continuation and other supplementary schools found in many parts of our country for those already out of school and at work. Nearly a million young men and women in the United States are working in such schools to-day, because they failed to obtain proper education in the public schools. Many of them do this work in the evening after the strenuous day's work of some industrial or commercial vocation. These are young men and women of sterling quality or they would not spend several evenings of each week for a number of years in their endeavor for self improvement. Let us have such schools so long as a need exists for them. But to me, these one million young people are just one million reasons why the public elementary and secondary schools should awake to their responsibility and *so establish the work of their daily offerings that no one may be driven out of them to secure a worthy education.* To me this hue and cry for separate and numerous schools for industrial training is a most scathing indictment of the practical efficiency and the boasted democracy of our whole school system. The Massachusetts Industrial Commission found, by personal visitations to 3,157 families whose children had dropped out of school from the middle and upper grades, that 76 per cent of them would have kept the children in school if they had felt that it was really worth

while. The whole discussion on this question is a direct charge that the subject matter, interests, and methods of the schools are remote from the real, vital, life business of our day. There is a valid demand that the materials and work of the schools should be all shot through with the most fundamental relationships of daily life activities. Not the organization of a new kind of school, nor yet the introduction of new subjects into the curriculum is the permanent solution of this problem. It lies rather in the building over of our common subjects of study to fit the needs and interests of our day. And this is just as true of the secondary school as of the elementary school.

So far, I have tried to indicate that the industrial arts rightly interpreted contain a rich and worthy body of thought and experience, and that properly organized they involve the revitalizing of practically the whole school curriculum. May we now dwell for a little upon the larger social and cultural elements involved in their appropriate study. I have alluded to the fact that as a common humanity we have more interests and qualities which are alike than which are different. In practically all of the great life values by which we measure human worths, our standards are wholly independent of vocations, as such. To confine effort to those processes alone by which man secures food, clothing and shelter stops at a point which is on the same level as the dominant life interests of squirrels, rabbits and wolves—the provision of mere creature comforts. The higher ideals of human life are above this plane. Making book racks, or sewing on buttons, or forging cold chisels, or making soap, are, in themselves, not worth much in relation to those higher values of love, social service, contemplation of the meanings of life, and the enjoyment of the products of art, literature, music and social intercourse. Thousands upon thousands of our working people are denied most of these higher privileges under present school and social conditions. Many perhaps even more of us, are so unconscious of these conditions and limitations that we feel no obligation or opportunity to remove them. By many who do

know these repugnant and unwholesome conditions, they are ignored. In our short-sighted way, we are sometimes even advocating and encouraging a system of narrow vocational teaching which will still further exploit the helplessness of the workingman and draw more closely the limitations about the lives of his children. Not a little of the advocacy of vocational training of to-day is directly encouraging the evils of child labor. Not a little of it is directly preparing men to attack our property, our institutions, and even our lives in their attempts to cure evils of which they are the victims but whose causes they radically misunderstand. The problems of democracy can not be settled by dynamite nor by the distrust and opposition of classes whose interests are really common. Are not these questions of the political and social lives and ideals of our industrial people of as vital significance to us as their capacity for material production? Let us look into certain facts that we may interpret their bearings.

In the manufacturing industries of the United States, there were at work in 1900, over 168,000 children under sixteen years of age, both an actual and a proportionate increase over 1890. In the report of the Government Investigating Commission on the condition of women and child wage earners in the United States, just issued, we find that in New York City, in one of the largest industries 96.6 per cent of the factories employing women and children were violating some provision of the child labor laws. Thirty-three per cent of the factories visited violated at least one of the provisions of the law regulating the hours of labor for women and girls. In some of our states men are working twelve or fourteen hours a day for seven days a week while other men are out of work, driven to charity or crime to support their families. Laxness everywhere prevails in the enforcement of the laws we have to protect children and other workers. But in the matter of legislation itself the story is even more disheartening. It is doubtful whether in a single state the workman is fully protected from loss of life or injury by compensation from the employer in those vocations involving risk of life

or limb. Courts even interpret constitutions as placing property rights above human rights. Seven of our states exempt children entirely from most of the restrictions on child labor in the canning industries on the ground that these industries deal with perishable materials—thus setting a higher value on sweet corn, tomatoes and beans than upon child life and its rights to natural growth!

Ten states permit children under fourteen to work in factories and workshops. Eight states will let boys of twelve work in mines. Fifteen states permit children under sixteen to work at night. Thirty-five states do not have the protection of the eight hour day for their working children. Although given expression over half a century ago in England, Mrs. Browning's "Cry of the Children" is charged with as much meaning and need for response in America to-day. As was true then, also to-day, many children—

> ".....are weeping in the playtime of the others,
> In the country of the free.....
>
> They know the grief of man without its wisdom;
> They sink in man's despair without its calm;
> Are slaves without the liberty of Christdom;
> Are martyrs by the pang without the palm."

And to those who know details of shop life, and of the home life in the thirteen thousand tenement houses in New York City licensed for the making and finishing of clothing where the labor of all members of the family can be utilized wthout reference to age or factory law, Thomas Hood's "Song of the Shirt" chants a message as true for us to-day as it was a century ago in a land across the sea. Women, men, and children as well, here:

> ".....Stitch—stitch—stitch,
> In poverty, hunger and dirt,
> Sewing at once with a double thread,
> A shroud as well as a shirt."

Government agents found such women and men working on garments while children in the house were suffering from

contagious diseases, these garments to be sent out to the trade all over our country. In 1822, Daniel Webster, in his Plymouth Oration uttered these words: "I fear that they (the people) may place too implicit confidence in their public servants, and fail properly to scrutinize their conduct; that in this way they may be dupes of designing men and become the instruments of their undoing....." In verification of this prophecy, note the words of one of these New York employers who finds home work profitable: "If public opinion is against tenement-made goods it cuts no figure whatever." And this in a democracy where the sovereign power lies in this same public opinion in just that measure in which it chooses to exert itself! One is reminded very much of the story of a certain man who went down from Jerusalem to Jericho and fell among thieves; and all of those upon whom fortune had imposed the really greatest obligation for helpful service passed by upon the other side. Democracy can prevail among a people only by developing conceptions of social obligations and duty which will make vocational differences in life sink into relative insignificance beside the greater common well-being of our whole people. The problem includes both the worker himself and those whom he has trusted with political and other social authority and responsibility. Justice and intelligence in those who are led must find co-operative justice and intelligence in their leaders. Common ideals must actuate both.

In seeking for this common denominator of experience in establishing common ideals, I submit that the same great appeals made to men and women of culture by the best products of man's creative genius are universal. The same masterpieces of literature, art, and music which stimulate appreciation, aspiration, and deeds of service among men and women who practice law, medicine and theology appeal just as strongly to men and women who practice in woodwork, metals, or textiles when these masterpieces are presented to them aright. When dramas or concerts of a high order are

offered in the New Theatre, or the Metropolitan Opera House, or in the parks especially to the people of industrial and commercial vocations, our newspaper editors manifest surprise that these people are so appreciative, and so uplifted. It would only be surprising if they were not. The distribution of human nature in its fundamental elements is democratic

Securing a point of contact for the working man with the products of genius other than that which is mechanical seems to be one of the great difficulties. This difficulty certainly lies partly in the deplorably low and insufficient ideals and methods in the selecting and teaching of masterpieces in literature, art, music, and history in the public schools. The Narrowness in selection and the academic metthod of instruction both contribute to the sad fact that these subjects often fail entirely to awaken any appreciative response in the boys and girls to whom they are taught. The literature, art, and music do not all need to be about industrial activities to reach the life interests of the individual workers. They too have the problems and fears and hopes that find comfort in the expressions of the best thoughts and feelings of the master poets, artists, and musicians. Man must have an anchorage in something of permanent worth to which he may relate the efforts of his daily life. "Man's reach should exceed his grasp," said Browning's *Del Sarto*. It is perspective, character, idealism, appreciation of higher possibilities that all men need to make them rise to realization of their fullest capacities. "The hand can never execute anything higher than the character can inspire," said Emerson.

Our workingman's character is our concern quite as much as the cunning of his hand. To develop this attitude of mind that will give the man an appreciation of the meaning and significance of his work is the problem. That great and unrealized possibilities lie in the appeals of the literary masterpieces which might be appropriately used in schools, an examination of available material will certainly reveal. Points of contact almost direct with the craftsman's work are found in the best contributions of the great masters. Go with George

Eliot into the shop of one Antonio Stradivarius, a maker of violins, and hear his words to his profligate artist friend:

"Who draws a line and satisfies his soul,
Making it crooked where it should be straight?
.....God be praised,
Antonio Stradivarius has an eye
That winces at false work and loves the true....
'Tis God gives skill,
But not without men's hands. He could not make
Antonio Stradivari's violins
Without Antonio."

This conception of the workingman's co-operation with God in the progressive creation of the social world lifts the craftsman from the plane of artisanship to that of art, no matter what the work may be. Emerson identifies man with the Creator in this resolution of man's world to his needs in the lines:

"The hand that rounded Peter's dome,
And groined the aisles of Christian Rome
Wrought in a sad sincerity;
Himself from God he could not free;
He builded better than he knew;—
The conscious stone to beauty grew."

The heroism of genius in the service of industry is appreciated and exalted again and again in the messages of literature. Longfellow pays high tribute to the world's greatest potters in his *Keramos*. He also shows his appreciation of the craftsman's own delight in his work as his Michael Angelo says:

"In happy hours, when the imagination
Wakes like a wind at midnight, and the soul
Trembles in all its leaves, it is a joy
To be uplifted upon its wings, and listen
To the prophetic voices in the air
That call us onward. Then the work we do
Is a delight, and the obedient hand
Never grows weary....."

Shakespeare, Browning, Tennyson, Kipling, Carlyle, George Eliot, Dickens, Victor Hugo, Emerson and many others whose perspective of social relationships was broad and deep, have given us much that has peculiar fitness for the man whose

vocational contribution is made by the united cunning of brain and hand.

Would not the acquaintance of the boy and girl with such master appeals from literature showing that there are points of common interest with their everyday work lead them to set a new value upon literary treasures? It is not his work in itself that is so destructive to the spiritual life of the industrial worker. It is rather that he has so little else in life. In *Shop,* Browning utters a protest against the narrowness of life which is so characteristic of our day:

> "Because a man has shop to mind
> In time and place, since flesh must live,
> Needs spirit lack all life behind,
> All stray thoughts, fancies fugitive,
> All loves except what trade can give?"

One of the great purposes of any worthy education is to teach men and women how to use their time of leisure so that it is an uplift to them rather than a stumbling block. They must be taught to look up for their pleasures and not down. If history, literature, art, and music are to reach out through life and enrich its leisure as well as to dignify and ennoble its work, the interest in these and the appreciation of their possibilities must be cultivated in the schools. History certainly has a large functional mission here in the life of the workingman. We are the sum of the whole past; and the whole past is needed to explain us. I mean by history that crystallized experience of the race in solving the problems of human progress, that study of the past which enables the student to penetrate and interpret the life about him. It is that study of the past which will stimulate activity, cultivate appreciation of values as to what is worth while, develop insight and judgment in making choices, enter functionally into the direction of experience. "The highest effect of art is to make new artists," said Emerson. Nothing so stimulates creative activity as the proper study of history. Our industrial worker needs to know Palissy, Watt, Arkwright, Morse, and Edison, but quite as much he needs to know

Moses, and Homer, and Dante, and Shakespeare, and Beethoven, and Wagner. Practical progress is forced upon him by the workaday world, but he can win for himself the currents of spiritual force and stimulation from the supermen of the past in these idealistic fields only by communion with them. Literature, art, and music are studied appropriately in the public schools only when they cultivate interest in and appreciation of man's evolution toward a fuller expression of his ideas and ideals of the true, the beautiful, and the good. Industry itself may be so studied that it will lead one to appreciate that its ultimate end is to utilize the material world in the development of man's best qualities—that this is really most of all a psychological and social world and not a world merely of material problems and processes.

The need has never been greater for the individual to exert a wise and intelligent force for social control. The live political and social issues of to-day are of especial significance to the working man. Some of the most pressing problems confronting us are those of the relationship of organized capital and organized labor, of property rights and human rights as involved in the claims of working men and women to reasonable protection of life, limb, and health, physical and moral; of the elimination of the evils of child labor; of the regulation of predatory corporations and interests; of the appropriate disposal of public servants who violate their trust; and of other large questions of social readjustment, all involving every citizen directly or indirectly. That such tragedies as the recent Washington Place fire in New York City, the removal of John Mitchell from the National Civic Federation by the Miners' Union, and the method of selecting the junior senator from Illinois, should all occur within a past so recent indicates the need of an awakened public conscience as applied to all forms of social intelligence and social control. Moreover a desire for a larger personal participation in political life is surely asserting itself. The certainty of the early provision for the popular election of United States senators, the general enactment of primary

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